Bematech

::Printer

MP-2100 TH

MP-2100 TH User´s Manual
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EMC and Safety Standards Applied

Product Name: MP-2100 TH
Model Name: All
*EMC is tested using an EPSON PS180 power supply

Europe:
 CE marking
 Safety: EN60950

North America:
 EMI: FCC Class A

WARNING
Unauthorized changes or modifications on the equipment could void the certifications described in this page.
Please contact your dealer for further information.

CE Marking

The printer conforms to the following Directives and Norms:
Directive 89/336/EEC
EN 55022 Class B (Conducted and Radiated emission)
EN 55024
      IEC 61000-4-2 ESD
      IEC 61000-4-3 Radiated immunity
      IEC 61000-4-4 EFTB
      IEC 61000-4-5 Surge
      IEC 61000-4-6 Conducted immunity
      IEC 61000-4-11 Voltage Dips

FCC CLASS A
DECLARATION OF CONFORMITY

This equipment has been tested and found to comply with the limits for a Class A digital service, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, use and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Safety Precautions

This section presents important information intended to ensure safe and effective use of this product. Please read this section carefully and store it in an accessible location.

⚠ WARNING:

Immediately unplug the equipment if it produces smoke, a strange odor, unusual noise or if foreign matter including water or other liquid falls into the equipment. Continued use may damage it or lead to fire *. Please contact your dealer or a BEMATECH service center for advice.

Never attempt to repair this product yourself. Improper repair work can be dangerous.

Never disassemble or modify this product. Tampering with this product may result in injury or fire *.

Be sure to use the specified power source. Connection to an improper power source may cause malfunction or fire *.

⚠ CAUTION:

Do not connect cables in ways other than those mentioned in this manual. Different connections may cause equipment damage and burning *.

Be sure to set this equipment on a firm, stable surface. The product may break or cause injury if it falls.

Do not install this equipment in locations that do not comply with the environmental requirements specified in this manual.

Do not place heavy objects on top of this product. Never stand or lean on this product. Equipment may fall or collapse, causing breakage and possible injury.

To ensure safety, unplug this product before leaving it unused for an extended period. In this case, please be sure to place a piece of paper between the platen and the paper roll, in the thermal mechanism, to avoid damage when restarting the printer.

* Note that this equipment was developed complying with international safety standards and therefore contains only limited flammability components.

Summary

Chapter 1

Presentation

Printer Description

Explanations about how each MP-2100 TH part operates are described in this manual.

Whenever some note refers to one of the parts, the corresponding number of such part will be in brackets, next to the note.

Led PAPER

Led ON LINE

Led POWER

PAPER key

ON LINE key

Figure 1

Back Cover

Front Cover

Front Cover opening knob

Base

Figure 2

DC Power Supply Connector

Drawer

Parallel Interface or USB (optional)

Figure 3

Serial Interface
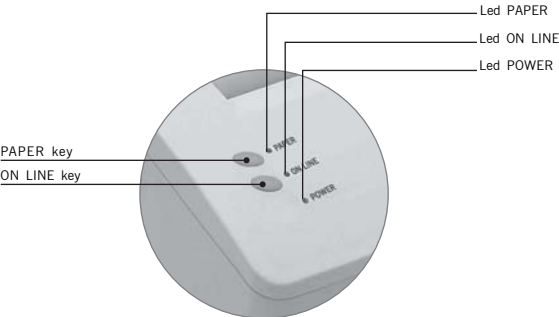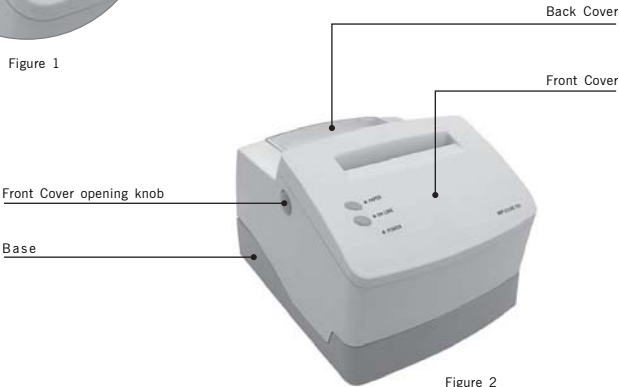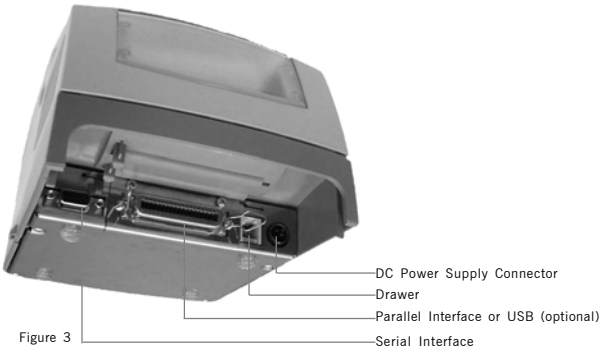
Unpacking

Take the printer out of its box and verify that the following items are included:

• Printer
• User´s Manual

Keep the box and packing materials for future use if necessary.

> The appropriate thermal paper should be used. Refer to the Technical Specifications section in this manual for paper details.

Powering

Make sure that the printer is turned off. Connect the power cord to the power supply's AC connector and to an electrical outlet. This outlet must have its ground pin connected as shown on the right:

GROUND
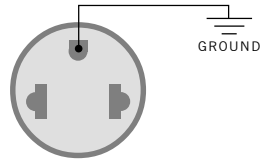
Figure 4

Connect the DC cable of the power supply in the printer as shown below – note that the arrow in the connector must be facing down:

DC Connector
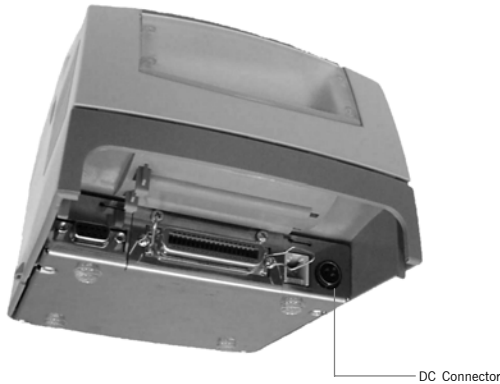
Figure 5

Turn on the printer using the on / off switch located on the printer. Check, also in the panel, if the Power LED is lit. If no paper is present, the Paper LED will also be lit.

Inserting the Paper

To insert the paper roll, open the back cover and the front cover according to Figures 6 and 7. Release the roll from the rollers.

Figure 6

Figure 7

The MP-2100 TH offers easy automatic paper placement . Just position it in the gutter entrance pushing it inwards (Figures 6 and 7). That makes the mini-printer to activate the automatic paper advance mechanism, thus making the paper replacing easier.

To make the paper insertion easier, cut the paper end according to the illustration . The paper will slip easier into the mechanism.
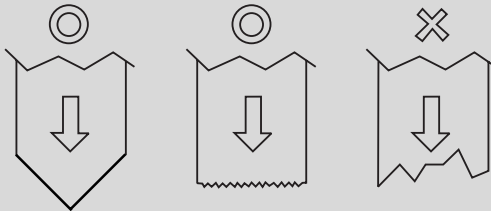
Figure 8

Operation Modes

The printer can be operated in the following modes:

Normal (Remote mode)

In this state, the printer is being controlled by the host through the serial, parallel or USB interfaces.

Dump mode

In this mode advanced users and programmers can identify communication problems between the host and the printer or check if a certain programmed data is correctly being sent to the printer, thus being a debugging tool. To start the hexadecimal dumping, turn on the printer while pressing the paper feed switch. A message will be printed on the paper asking you to press once more the paper feed switch if Dump mode is desired, as shown:

```
- Press PAPER switch once for DUMP MODE
```

Self-testing

To run a self-test press and hold the Paper Feed switch and turn it on. When the printer starts printing, the paper feed button can be released. A message will be printed asking you waiting for the self-test. In the self-test you will find the printer firmware version.

Printer head cleaning procedure

Please releve to Appendix IV "Special Care" (page 28).

Chapter 2

Technical Specifications

Characteristics	Specifications	
Printing	Method: Dot Density: Width: Speed: Paper forward unit:	lines of thermal dots 8 dots per mm 72 mm 80 mm/s 0.125 mm
Features	Characters supported: Code of bars supported:	CODE PAGE850, CODE PAGE 858, CODE PAGE 860 and CODE PAGE 437 UPC-A, UPC-E, EAN13, EAN8, CODE 39, ITF, CODABAR, CODE 93, CODE 128, ISBN, MSI, PLESSEY, PDF0417.
Printing Paper	Paper max width: Thickness: Max. Coil diameter: Type: Polling force:	78 mm to 80 mm 50 to 120 g/mm^2 65 mm KPH756 thermo script, manufactured by VCP or equivalent 2N minimum
Entry Buffer	8 Kbytes	
Communication Interfaces	Serial: • Transmission rate: • Protocol: • Format: Parallel (optional): USB (optional):	RS-232C 9600 bauds RTS/CTS 8 bits without parity / 1 stop bit Centronics compatible 1.1 version
Power Supply	Voltage: Consumption: In operation:	24 VDC Switched-off, 15 W 35 W
Detection Functions	Print head temperature (termistor), paper presence (phototransistor), print head lifted (optical key).	

Environmental Conditions	Environmental storage conditions:
	
	    Temperature: 0ºC to 50ºC
	    Relative humidity: 10% to 95%.
	
	Environmental storage conditions:
	    Temperature: -20°C to 70°C
	    Relative humidity: 10% to 95%	

Size	Height: Width: Depth:	132 mm 152 mm 196 mm
Life Expectation - MCBF	Head: Cutter:	Abrasion: 80 km exclusively for certified paper (printing 20% of the line) 1.5 millions cuts (for certified paper of 56g/mm^2)
Power Activation	Drawer	
Mass	Mass: With Cutter:	1,2 kg 1,3 kg
Cutter	Cutting Options: Total or partial cut (option per way of activation).	

Chapter 3

Communication Interfaces

Communication between a host and the printer can be performed in three communication interface: USB, Parallel or Serial RS-232, according to the printer model.

Communication cables are not supplied with the printer

Serial Interface

The RS232 serial interface uses a female DB-9 connector. The serial port can operate using the RTS/CTS mode, with 8 data bits, without parity, one start bit and one stop bit. In the RS232 standard, the logic low level corresponds to a +12V voltage level and a logic high level corresponds to a −12V voltage level.

RTS/CTS mode

In this mode, the printer's RTS line controls the flow of data sent from the host's TX line and received by the printer's RX pin. In this case, when the printer's RTS signal is low (+12V) the printer requests the host to send data. When the RTS signal is high (-12V) the printer tells the host to stop sending data.

DB-9 Serial connector
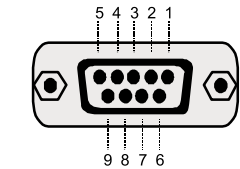
Figura 9

Logic Level	Voltage
0	+ 12 V
1	- 12 V
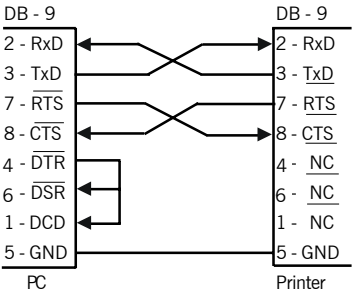
Pin	Sign	Direction	Description
2	Rx	IN	Through this pin the data are received by the printer.
3	Tx	OUT	Through this pin the data are transmitted from the printer to the device to her connected.
7	RTS	OUT	When in low level the printer requests the sending of data. When in high level the printer is without document.
8	CTS	IN	When in low level, the printer sends data (if there is). When in high level, the printer for of sending data, if she is sending.
5	GND		Logic ground.

Parallel Interface

The unidirectional parallel interface has the following specifications:

- Synchronization: Externally supplied Strobe signal

- Handshaking: Ack and Busy signal

- Signal levels: TTL compatible

- Data transmission: 8-bit parallel

Parallel Interface Pin Assignments
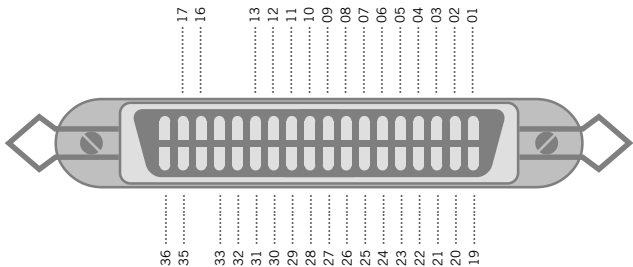
Figura 10

Signal pin	Associated return pin	Signal	Direction	Description
1	19	/STROBE	IN	Strobe pulse for data reading. The pulse's width must be larger than 0.5 us.
2	20	Data 1		
3	21	Data 2		
4	22	Data 3		
5	23	Data 4	IN	Data in signals (LSB is Data 1). The signal high level corresponds to bit 1 and the low level corresponds to 0.
6	24	Data 5		
7	25	Data 6		
8	26	Data 7		
9	27	Data 8		

Signal pin	Associated return pin	Signal	Direction	Description
10	28	/ACK	OUT	This pulse is active low and indicates that data sent to the printer has been received. The pulse width must be larger that 10us.
11	29	BUSY	OUT	When high, indicates that the printer cannot receive data.
12	30	PE	OUT	1 – Paper end.
13		OL OUT	OUT	On line Out. When high, indicates operation in remote mode. When low, indicates operation in local mode.
14,15,18,36		NC		Not connected.
16		GND		Circuit ground.
17		Frame		Frame ground.
19-30		GND		Circuit ground.
31		/INIT	IN	When low initializes the printer. It may be larger than 50us.
32		/ERROR	OUT	Paper absence.
33		GND		Circuit ground.
34		NC		Not connected.
35		PULLUP	OUT	"Pulled Up" to +5V

USB Interface

The USB interface is compatible with the Universal Serial Bus Specification 1.1. It is a 12 Mbps serial channel using the Bulk mode with a "B" receptacle as show below. The USB cable must have in one side an "A" plug to connect in the host, and in the other side an "B" plug to connect in the printer. The printer is self-powered and does not draw power from the standard type B USB interface cable.

Type "B" Receptacle

2 1

3 4

Figure 11

Signal pin	Signal
1	NC
2	DATA+
3	DATA -
4	GND

Using the USB interface, the printer can be connected in the host even if both parts are powered. The first time you connect the printer in the host, the operational system will ask for the printer driver. Please download the printer driver from our website (www.bematech.com). For more details please contact your dealer.

Chapter 4

Character Tables

ASCII Table

The codes from 00h up to 7Fh are shown below:

Code (Hex)	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL							BEL	BS	HT	LF	VT	FF	CR	SO	SI
1		DC1	DC2	DC3	DC4				CAN			ESC				
2	SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	A	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{			}	~	DEL

> Characters from 00h to 1Fh are "command characters" and therefore are not represented in the following tables

Code Page 850

Code (Hex)	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	(space)	0	@	P	`	p	Ç	É	á	░	└	ð	Ó	-
_1	!	1	A	Q	a	q	ü	æ	í	▒	┴	Ð	ß	±
_2	"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	_
_3	#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
_4	$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
_5	%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§
_6	&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
_7	'	7	G	W	g	w	ç	ù	º	À	Ã	Î	Þ	¸
_8	(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	þ	°
_9	)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
_A	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
_B	+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
_C	,	<	L	\	l			î	£	¼	╝	╠	▄	ý	³
_D	-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²
_E	.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	‾	■
_F	/	?	O	_	o		Å	ƒ	»	┐	¤	■	`	■

Code Page 437

Code (Hex)	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	(space)	0	@	P	`	p	Ç	É	á	░	└	╨	α	≡
_1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
_2	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
_3	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
_4	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
_5	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
_6	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
_7	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
_8	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
_9	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	·
_A	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
_B	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
_C	,	<	L	\	l	¦	î	£	¼	╝	╠	▄	∞	ⁿ
_D	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²
_E	.	>	N	^	n	~	Ä	Pt	«	╛	╬	▐	ε	■
_F	/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	

Code Page 858

Code (Hex)	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	(space)	0	@	P	`	p	Ç	É	á	░	└	ð	Ó	-
_1	!	1	A	Q	a	q	ü	æ	í	▒	┴	Ð	ß	±
_2	"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	=
_3	#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
_4	$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
_5	%	5	E	U	e	u	à	ò	Ñ	Á	┼	€	Õ	§
_6	&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
_7	'	7	G	W	g	w	ç	ù	º	À	Ã	Î	Þ	¸
_8	(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	þ	°
_9	)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
_A	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
_B	+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
_C	,	<	L	\	l	¦	î	£	¼	╝	╠	▄	ý	³
_D	-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²
_E	.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	■
_F	/	?	O	_	o		Å	ƒ	»	┐	¤	▀	`	

Tabela de Caracteres Code Page 860

Code (Hex)	2_	3_	4_	5_	6_	7_	8_	9_	A_	B_	C_	D_	E_	F_
_0	(space)	0	@	P	`	p	Ç	É	á	▓	└	⊥⊥	α	≡
_1	!	1	A	Q	a	q	ü	À	í	▓	⊥	╤	ß	±
_2	"	2	B	R	b	r	é	È	ó	▓	┬	╥	Γ	≥
_3	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
_4	$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠
_5	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
_6	&	6	F	V	f	v	Á	Ú	ª	╢	╞	╓	µ	÷
_7	`	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
_8	(	8	H	X	h	x	ê	Ì	¿	╕	╚	╪	Φ	°
_9	)	9	I	Y	i	y	Ê	Õ	Ò	╣	╔	┘	Θ	·
_A	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
_B	+	;	K	[	k	{	Í	¢	½	╗	╦	█	δ	√
_C	,	<	L	\	l	¦	Ô	£	¼	╝	╠	▄	∞	^{n}
_D	-	=	M	]	m	}	ì	Ù	¡	╜	=	▌	φ	^{2}
_E	.	>	N	^	n	~	Ã	Pt	«	╛	╬	▐	ε	■
_F	/	?	O	_	o		Â	Ó	»	┐	╧	▀	∩	

Chapter 5

MP-2100 TH Commands

> This section contains general information regarding the MP-2100 TH commands.

The MP-2100 TH printer has a series of programming commands that may be used in the remote mode. Two types of commands can be sent:

Direct Command

In this mode, a simple ASCII code is enough to command the printer. For example:

ASCII Code:	LF
Decimal:	10
Hexadecimal:	0A

This command causes the printer to perform a line feed.

Control Sequence

In this mode, more than one code may be sent to command or program the printer. This "control sequence" always starts with the ASCII code "ESC" or "GS". For example:

ASCII Code:	ESC	W	1
Decimal:	27	87	01
Hexadecimal:	1B	57	01

This command switches the printing mode to "expanded".

Following is a summary of commands accepted by the MP-2100 TH printer.

Using The Command Summary

The following section lists and describes all resident MP-2100 TH commands including command parameters. The command syntax is as follows:

• ESC P is a command without parameters;

• ESC Q n is a command with one parameter only;

• ESC K n1 n2 is a command with two parameters;

• ESC D *! n1n2 b1...bn is a command with a variable number of parameters.

> Some commands may be redundant. This is done to maintain compatibility with old command settings or different types of customized command settings.

Chapter 6
Command Tables

Operation

ASCII	Dec	Hex	Description
ESC @	64	40	Initializes the printer
ESC b n	98	62	Enable (1): Status drawer sensor Disable (0): Status paper sensor
ESC v n	118	76	Activate drawer (n miliseconds) -50ms < n < 200ms
ESC w	119	77	Performs a paper cut
ESC x	120	78	Enable Dump Mode
ESC y n	121	79	Enable (1) or Disable (0). Keyboard default (1)
ESC z 1/0	122	7A	Enable automatic line feed (n=1). Disable automatic line feeed (n=0)
ESC m	109	6D	Performs a parcial paper cut

Vertical Positioning

ASCII	Dec	Hex	Description
ESC C n	67	43	Programs the page size in lines where n is the number of lines (single height). The standard is 12 lines (of single height).
ESC c n1 n2	99	63	Programs the page size in millimeters where Size=0,125mm*n1*n2.
ESC J n	74	4A	Performs the feeding of n*0,125mm of paper.
FF	12	0C	Feeds one page.
LF	10	0A	Feeds one line.
ESC 2	50	32	Line feed of 1/6" – default line feed
ESC 3 n	51	33	Line feed of n/144 of an inch, where n goes from 18(d) up to 255(d).
ESC f 1 n	102	66	Vertical skipping of n characters.
ESC A n	65	41	Performs the feeding of n*0,375mm of paper.

Horizontal Positioning

ASCII	Dec	Hex	Description
ESC f 0 n	102	66	Horizontal skipping of n characters.
ESC Q n	81	51	Program right margin to column n
ESC l n	108	6c	Program left margin to column n
ESC a n	97	61	Aligning the characters. Centering if n=1 or left end alignment if n=0.

Character Types

ASCII	Dec	Hex	Description
ESC - n	45	2D	Underlined mode on (n=1) or off (n=0).
ESC 4	52	34	Italic mode on.
ESC 5	53	35	Italic mode off.
ESC E	69	45	Emphasized mode on.
ESC F	70	46	Emphasized mode off.
ESC t n	116	74	Selects code page: n=2 (CODEPAGE 850 - Default) n=3 (CODEPAGE 437) n=4 (CODEPAGE 860) n=5 (CODEPAGE 858)
ESC S n	83	53	n=0 (enable superscript characters) n=1 (enable subscript characters)
ESC T	84	54	Disable superscript and subscript modes
ESC N n	78	4E	n=0 (density very weak) n=1 (density weak) n=2 (density normal) n=3 (density strong) n=4 (density very strong)
ESC } n	125	7D	n=1 (inverted mode enable) n=0 (inverted mode disable)

Print Width, Character Width And Height

ASCII	Dec	Hex	Description
DC2	18	12	Condensed mode (42 columns) off.
DC4	20	14	One-line expanded mode off.
ESC d n	100	64	Double height on (n=1) or off (n=0).
ESC H	72	48	48-column mode on (default).
ESC P	80	50	48-column mode on (default).
ESC SI	15	0F	Condensed mode (64 columns) on.
ESC SO	14	0E	One-line expanded mode on.
ESC V	86	56	One-line double height on.
ESC W n	87	57	Expanded mode on (n=1) or off (n=0).
SI	15	0F	Condensed mode (64 columns) on.
SO	14	0E	One-line expanded mode on.

Barcodes

Barcodes are obtained using the GS command sequences show below. Please note that all parameters and numbers are in decimal format, unless noted.

Comand	Hexadecimal Decimal	Description
GS h n	1D 68 n 29 104 n	Sets the height n of the barcode generated – each height unit corresponds t a dot of 0.125 mm, so the final height is n x 0.125 mm where 1 - n - 255. The default is n=162.
GS w n	1D 77 n 29 119 n	Determines the width of the barcode, where n=2 corresponds to normal width, n=3 is double width and n=4 is quadruple width. The default is n=3.
GS H n	1D 48 n 29 72 n	Choose the position of the human readable information (HRI) of the barcode. n=0: No HRI n=1: On top of the barcode (default) n=2: On the bottom of the barcode n=3: Both on top and on the bottom of the barcode.
GS f n	1D 66 n 29 102 n	Sets the font used to print the human readable information (HRI). The default is n=0. n=0 or n=48 – normal n=1 or n=49 – condensed
GS k 0 $d_1...d_{11}$ NUL	1D 6B 00 $d_1...d_{11}$ 00 29 107 0 $d_1...d_{11}$ 0	Prints an UPC-A barcode where $d_1...d_{11}$ is a sequence of 11 bytes containing the barcode information with 48 -d -57.
GS k 0 65 11$d_1...d_{11}$	1D 6B 41 0B $d_1...d_{11}$ 29 107 55 11 $d_1...d_{11}$	
GS k 1 $d_1...d_6$ NUL	1D 6B 01 $d_1...d_6$ 00 29 107 1 $d_1...d_6$ 0	Prints an UPC-E barcode where $d_1...d_6$ is a sequence of 6 bytes containing the barcode information with 48 -d -57.
GS k 66 6 $d_1...d_6$	1D 6B 42 06 $d_1...d_6$ 29 107 66 6 $d_1...d_6$	
GS k 2 $d_1...d_{12}$ NUL	1D 6B 02 $d_1...d_{12}$ 00 29 107 2 $d_1...d_{12}$ 0	Prints an EAN-13 barcode where $d_1...d_{12}$ is a sequence of 12 bytes containing the barcode information with 48 -d -57.

Comand	Hexadecimal Decimal	Description
GS k 67 12 $d_1...d_{12}$	1D 6B 43 0C $d_1...d_{12}$ 29 107 67 12 $d_1...d_{12}$	Prints an EAN-13 barcode where $d_1...d_{12}$ is a sequence of 12 bytes containing the barcode information with 48 -d -57.
GS k 3 $d_1...d_7$ NUL	1D 6B 03 $d_1...d_7$ 00 29 107 3 $d_1...d_7$ 0	Prints an EAN-13 barcode where $d_1...d_7$ is a sequence of 7 bytes containing the barcode information with 48 -d -57.
GS k 68 7 $d_1...d_7$	1D 6B 44 07 $d_1...d_7$ 29 107 68 7 $d_1...d_7$	
GS k 4 $d_1...d_n$ NUL	1D 6B 04 $d_1...d_n$ 00 29 107 4 $d_1...d_n$ 0	Prints a CODE 39 barcode where n indicates the number of bytes that will be sent and $d_1...d_n$ is the sequence of n bytes containing the barcode information. The bytes that can be used in d are 32, 36, 37, 43, 45 to 57 and 65 to 90 (upper case letters) or 97 to 122 (lower case letters). Lower case and upper case letters can't be conbined in the same barcode.
GS k 69 n $d_1...d_n$	1D 6B 45 n $d_1...d_n$ 29 107 69 $d_1...d_n$	
GS k 5 $d_1...d_n$ NUL	1D 6B 05 $d_1...d_n$ 00 29 107 5 $d_1...d_n$ 0	Prints an ITF barcode where n indicates the number of bytes that will be sent and $d_1...d_n$ is the sequence of n containing the barcode information with $48 < d < 57$.
GS k 70 n $d_1...d_n$	1D 6B 46 n $d_1...d_n$ 29 107 70 $d_1...d_n$	
GS k 5 $d_1...d_n$ NUL	1D 6B 06 $d_1...d_n$ 00 29 107 6 $d_1...d_n$ 0	Prints a CODABAR barcode where n indicates the number of bytes that will be sent and $d_1...d_n$ is the sequence of n bytes containing the barcode information. The bytes that can be used in d are 36, 43, 45 to 57 and 65 to 68 (upper case letters) or 97 to 100 (lower case letters). Lower case and upper case letters can't be conbined in the same barcode.
GS k 71 n $d_1...d_n$	1D 6B 47 n $d_1...d_n$ 29 107 71 $d_1...d_n$	
GS k 72 n $d_1...d_n$	1D 6B 48 n $d_1...d_n$ 29 107 72 $d_1...d_n$	Prints a CODE 93 barcode where n indicates the number of bytes that will be sent and $d_1...d_n$ is the sequence of n bytes containing the barcode information. This code can use all bytes from 0 to 127.
GS k 73 n $d_1...d_n$	1D 6B 49 n $d_1...d_n$ 29 107 73 $d_1...d_n$	Prints a CODE 128 barcode where n indicates the number of bytes that will be sent and $d_1...d_n$ is the sequence of n bytes containing the barcode information. This code can use all bytes from 0 to 127. The subset is automatically chosen by the printer based on the data received.
GS k 128 n_1 n_2 n_3 n_4 n_5 n_6 $d_1...d_n$	1D 6B 80 n_1 n_2 n_3 n_4 n_5 n_6 $d_1...d_n$ 29 107 128 n_1 n_2 n_3 n_4 n_5 n_6 $d_1...d_n$	Prints a PDF-417 barcode where: n_1 is the ECC level (from 0 to 8) n_2 is the pitch height (from 1 to 8) where height=n_2 x 0.125 mm. n_3 is the pitch height (from 1 to 4) where height=n_3 x 0.125 mm. n_4 is the number of codewords per row – if n_4 is 0, the maximum number of columns allowed for the pitch width informed will be used. If the barcode can't fit the print width the printer automatically adjusts it for the maximum permitted width within the line field. n_5 and n_6 indicate the number of bytes that will be coded, where total=n_5+n_6 x 256. $d_1...d_n$ is the actual sequence of bytes that will be coded.
GS k 21 $d_1...d_9$ NUL	1D 6B 15 $d_1...d_9$ 00 29 107 21 $d_1...d_9$ 0	Prints an ISBN barcode where $d_1...d_9$ is the sequence of 9 bytes containing the barcode information. The bytes that can be used in d are 45, 48 to 57 and 88 – note that the hyphens are not computed in the 9 bytes received.
GS k 129 9 $d_1...d_9$	1D 6B 81 9 $d_1...d_n$ 29 107 129 9 $d_1...d_n$	
GS k 22 $d_1...d_n$ NUL	1D 6B 16 $d_1...d_n$ 00 29 107 22 $d_1...d_n$ 0	Prints a MSI barcode where n indicates the number of bytes that will be sent and $d_1...d_n$ is the sequence of n bytes containing the barcode information. The bytes that can be used in d are 48 to 57. The limitation of size for this barcode is given by the print field as well as the configured bar width.
GS k 130 n $d_1...d_n$	1D 6B 82 n $d_1...d_n$ 29 107 130 n $d_1...d_n$	
GS k 23 $d_1...d_n$ NUL	1D 6B 17 $d_1...d_n$ 00 29 107 23 $d_1...d_n$ 0	Prints a PLESSEY barcode where n indicates the number of bytes that will be sent and $d_1...d_n$ is the sequence of n bytes containing the barcode information. The bytes that can be used in d are 46 to 57 plus 65 to 70 (upper case letters) or 97 to 102 (lower case letters). Lower case and upper case letters can't be combined in the same barcode. The limitation of size for this barcode is given by the print field as well as the configured bar width.
GS k 131 n $d_1...d_n$	1D 6B 83 n $d_1...d_n$ 29 107 131 n $d_1...d_n$	
GS k 132 n_1 n_2	1D 6B 84 n_1 n_2 29 107 132 n_1 n_2	Programs the position of the bardode's left margin position given by n_1+n_2 x 256.

Bit Images And Graphics

ASCII	Dec	Hex	Description
ESC $ n1 n2	36	24	Fill in blank bit columns, from the actual column until column number (n1+n2*256), where n1+n2*256<=576.
ESC * ! n1 n2 b1...bn	42 33	2A 21	24-bit graphics. Programs bit image for 24 bits, in double density where n1+n2*256 is the number of bit-columns that will be sent (see below) and b1...bn are the bytes that compose the bit image. For each column one may need 3 bytes to complete. So, if you need to send an image with an 8-column width you may send 24 bytes to fill those columns. A full line has 576 bit columns so a full line will need 576*3 = 1728 bytes.
ESC K n1 n2 b1...bn	75	4B	8-bit graphics. Selects the "8 pin" bit image (compatible with matrix printers) where you use n1+n2*256 columns, with 1 byte per column thus using a lower resolution and up to 576 columns.

Graphic Commands Examples

24-bit graphics

Figure 12

For this 24-bit graphic pattern we have eight bit-columns, each with a height of 3 bytes (24 bits). The printer must, after the command is stated, receive the 1st , 2nd and 3rd bytes of the first bit-column, than the 1st , 2nd and 3rd bytes of the second bit-column and so on, until the last bit-column is filled.
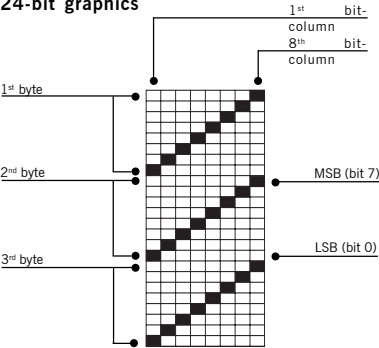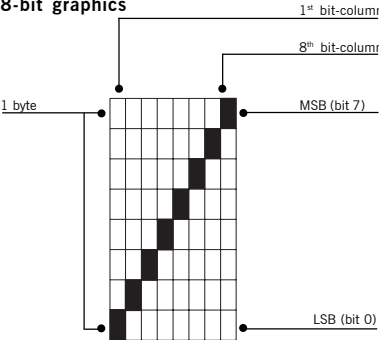
The command sequence to print this graphic pattern would be (numbers in decimal):
ESC * ! 8 0 1 1 1 2 2 2 4 4 4 8 8 8 16 16 16 32 32 32 64 64 64 128 128 128
Where you have 8 + 0 * 256 = 8 bit-columns to be filled, each with 3 bytes that will give us a total of 24 bytes to be sent (excluding the command sequence).

8-bit graphics

Figure 13

For this 8-bit graphic pattern we have eight bit-columns, each with a height of 1 byte (8 bits). The printer must, after the command is stated, receive the byte for the first bit-column, than the byte for the second bit-column and so on, until the last bit-column is filled. The resolution is lower but needs less bytes to be sent to the printer.

Data Control

ASCII	Dec	Hex	Description
CAN	24	18	Cancel last line
DEL	127	7F	Cancel last character

Communication

ASCII	Dec	Hex	Description
ENQ	05	05	Serial communication status inquiry. After this command is issued, the printer returns a status, defined below.
ETX	03	03	Ends buffer – the printer will be BUSY while the printing is performed, changing status only when the buffer is empty. On serial interfaces DTR (RTS) will be high while the printing is performed.
STX	02	02	Clears the buffer.

Parallel interface status byte

The table below shows the printer statuses obtained through the parallel interface, with the PC BIOS function "Get status printer" (Int 17h – Printer I/O):

Parallel Interface Status Byte									Description
/BUSY	/ACK	PE	SEL	ERROR	X	X	X	HEX	
1	0	0	1	0	0	0	0	90h	On Line (Remote mode)
1	0	1	0	1	0	0	0	A8h	Paper end
1	0	x	1	1	0	0	0	98h/B8h	Head Up

Serial interface status byte

The serial interface status byte is composed of 8 bits – 7 through 0 – the most significant bit is Bit 7 and the least significant bit is Bit 0.

Status bit number	Logic "0"	Logic "1"
0	Printer Off Line	Printer On Line
1	Printer has paper	Printer without paper
2 (After ESC b 1)	Drawer sensor level low	Drawer sensor level high
3	Print head down	Print head raised
4 – 7	Not used (will always be logic "0")	

USB interface status bytes

Byte / Bit	1. Printer Status	2. OFF-LINE Status	3. Error Status	4. Continuous Paper Sensor Status	5. Firmware Version
0	0	1	0	1	Minor Firmware version digit
1	0	0	0	0	
2	Reserved	Reserved	Cutter Installed	Head Temp.	
3	ON/OFF LINE	Head-up	Paper Cut Error	Reserved	
4	0	Reserved	1	1	Major Firmware version digit
5	Status buffer	No paper	Non Recov Error	Int. Paper Jam	
6		Error	Recov Error	Reserved	
7	1	1	1	1	0

Appendix I

Troubleshooting

The following table described some of the problems that might occur while using the printer. For every problem there is a possible cause described here and a suggested procedure to solve the problem.

Problem	Possible Cause	Possible Cause
The printer does not turn on.	There is no power in the electric outlet.	Check if there is a central switch for the room / outlets. Connect some other equipment to the outlet to check its operation.
	A problem with the power cord – it may be broken or not well connected to the printer and / or outlet.	Turn off the printer, check the power cord's continuity and a perfect connection between the printer and the electric outlet.
The printer does not respond to the commands sent.	The parallel / serial / USB cable has one or more lines with faulty connections / broken wires.	Check for a good connection between the printer and the host or change the cable.
	Wrong programming sequences.	The programming sequences can be checked in the dump mode. Put the printer in dump mode and run your application again. The printer will show the hexadecimal and ASCII codes of all bytes being received from the host.
Parallel communication is faulty.	The parallel cable has one or more lines with faulty connections / broken wires.	Check for a good connection between the printer and the host or change the parallel cable.
	The pin layout does not follow the Centronics standard.	Check the correct pin layout in this manual.
Serial communication is faulty.	The serial cable has one or more lines with faulty connections / broken wires.	Check for a good connection between the printer and the host or change the serial cable.
	The pin layout does not follow the correct protocol.	Check if the pin layout used complies with the protocol being used for data transmission. Remember that the printer uses the RTS/CTS protocol.
	The baud rate is incorrectly set.	If the baud rate set on the printer is different from the baud rate of the host, the printer will print random characters or not print at all. Check carefully the host's serial baud rate configuration.
The printer stops printing	Overheating of the print head	Wait until the temperature of the print head goes below 140°F. The printer will continue to print from where it stopped. Open the covers to help the printer to cool down faster.

Appendix II

Automatic Line Advance

When the automatic line forward (Automatic LF) is turned on, it makes the MP-2100 TH to automatically go ahead one line, after receiving a CR command (Carriage Return).

When it starts, the MP-2100 TH's automatic line forward is turned off.

In order to turn it on, just use the ESC z 1 command, as described in Chapter 5.

Appendix III

Cutter (Optional)

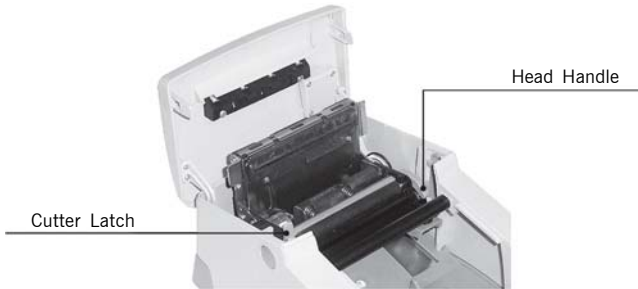The following considerations will be valid only if your printer contains a cutter.

Figure 17

About the Cutter

The cutter is a shearing blade that cuts the paper totally or partially, doing away with the use of a cutting edge .

For a perfect operation of the equipment, do not insert any object that should obstruct this shearing blade course. It will cause a permanent damage to the printer.

In order to assure the cutter operation, do not pull the paper before it has concluded the cutting.

Appendix IV
Special Care

MP-2100 TH Cleanup

In order to maintain your printer in good shape, you should clean it regularly according to the following procedure:

1. Turn the MP-2100 TH off;

2. Open the front cover;

3. Unlock and open the cutter activating the green lock (in case your printer has a cutter);

4. If the paper is inserted, lift up the thermal head handle by activating the green handle;

5. Open the back cover and remove the paper coil;

6. Use a soft flannel or cloth and remove carefully the accumulated dust;

7. If the machine cabinet is dirty, clean it with a soft cloth wetted with water or natural detergent. Never use a chemically treated tow or chemical materials of any kind. The use of such products may cause the cabinet to change the color or become deformed.

> Never introduce objects or tools into the printer.

Cleanup of the Thermal Printing Head

When your printer presents degradation of printing quality, probably a dirt accumulation in the thermal printing head has occurred. It usually takes place after printing more than 100 paper coils. In order to clean it up do as follows:

1. Be sure that the printer is turned off;

2. Open the two printer covers;

3. Open the cutter by activating the green lock (for models with cutter);

4. Lift up the thermal head by activating the green handle;

5. Remove the paper from the printer;

6. Use a swab wetted with alcohol and passes it softly over the black line of the thermal head in order to remove the accumulated dirt. Be sure to avoid the alcohol from flowing to other parts of the printer and be sure not to scratch or damage the thermal printer head.

7. Be sure that the thermal head is clean and dry;

8. Close the head and the cutter;

9. Turn the printer on;

10. Insert the paper, according to item "INSERTING THE PAPER".

> Tests revealed that this procedure becomes necessary more often as the printer head gets used.

Use Location

The MP-2100 TH should operate placed on a plain surface where its air inlets are kept unobstructed.

Avoid placing the printer in humid places, subject to dust or to heat action, such as sun light and heaters.

Appendix V

Drawer Activation

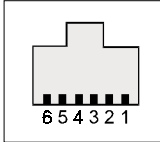A connector is located in your MP-2100 TH's rear for the drawer activation. Its pinning is described below:

Figure 18

- Pin 1 = GND
- Pin 2 = Solenoid activation for drawer opening
- Pin 3 = Sensor of open/close drawer (the Printer comes back 1 for sensor open and 0 for sensor closed).
- Pin 4 = +24V
- Pin 5 = NC
- Pin 6 = GND

IMPORTANT

Watch the drawer's mark before connecting it to the MP-2100 TH, since inverting the drawer may damage the printer.

Appendix VI

Errors Signaling Table

In case an error occurs, it may be indicated through the LED PAPER. The quantity of LED blinks will indicate a possible error. After the corresponding quantity of blinks to the possible error, a pause will occur. The blinks and the pause are cyclical, according to the following table:

Error	Quantity of blinks	Possible Cause
Mechanism	3	Thermal head damaged or connection problem of the mechanism with the controlling board.
Cutter	4	Cutter not operating.
Power supply	5	Power supply voltage below 20 V
Temperature	6	Thermal head temperature above safe conditions

Annotations

Annotations

>>> *Printer ::* **MP-2100 TH**

Revision 1.1 :: P/N 5686-EU

BemaTECH